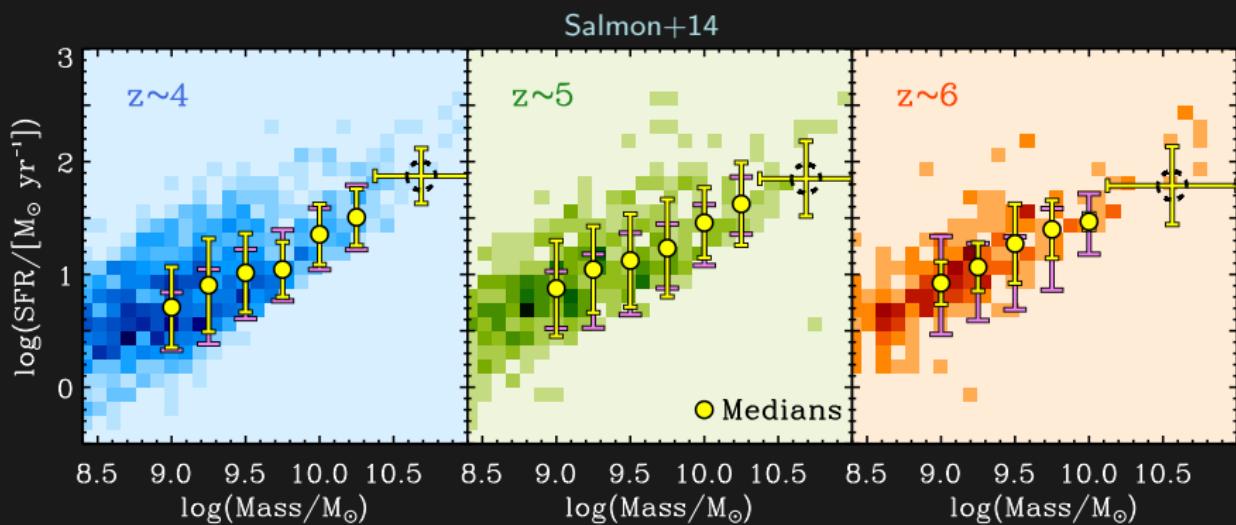


The Herschel view of the dominant mode of galaxy growth from $z = 4$ to the present day

Corentin Schreiber

Maurilio Pannella, David Elbaz,
Matthieu Béthermin, Hanae Inami,
et al., November 13th 2014

The Main Sequence of star-forming galaxies

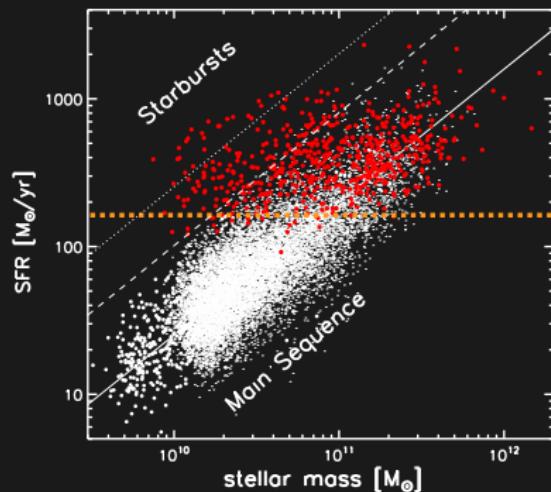


The Main Sequence of star-forming galaxies

Is it real?

Is it real?

Rodighiero+11

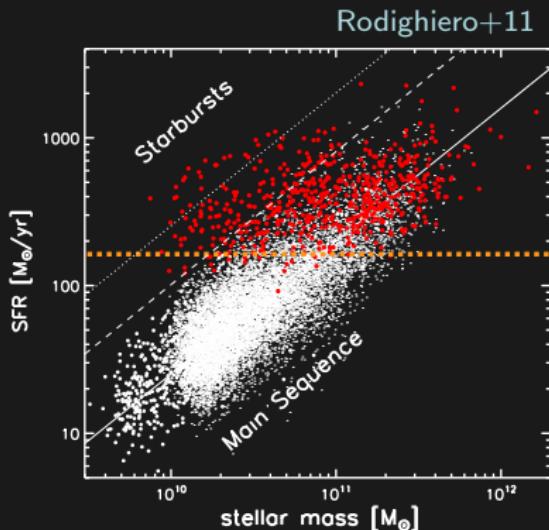


correcting for dust attenuation is
a challenging task

The Main Sequence of star-forming galaxies

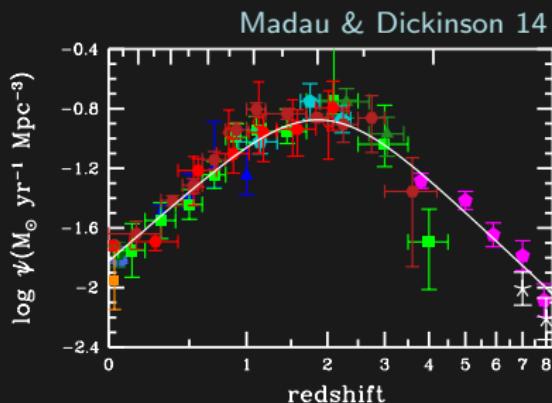
Is it real? And should we care?

Is it real?



correcting for dust attenuation is
a challenging task

And if so, should we care?

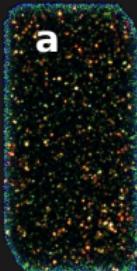


is it where most stars are
formed?

GOODS & CANDELS & COSMOS

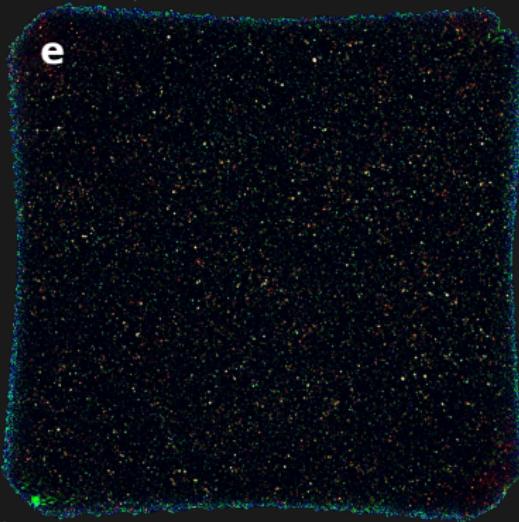
Among the deepest Herschel, Spitzer and Hubble fields

R: 250, G:160, B:100

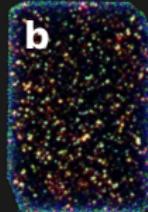


r-scaled down x1.4

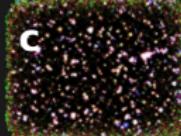
R: 250, G:160, B:100



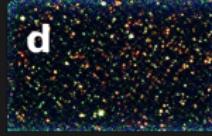
R: 250, G:160, B:100



R: 160, G:100, B:24



R: 250, G:160, B:100



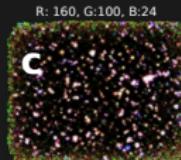
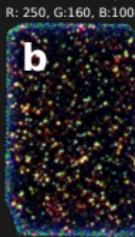
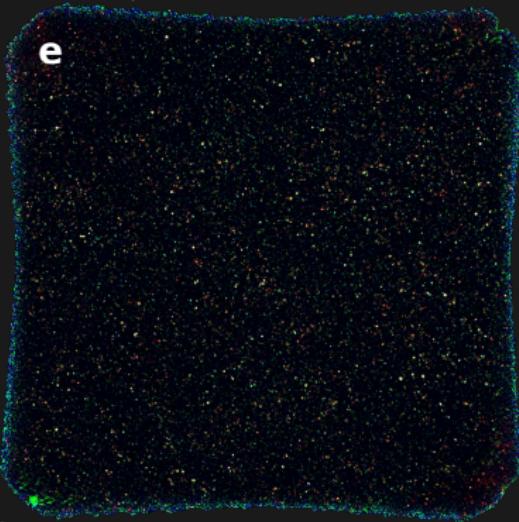
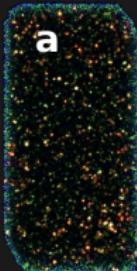
GOODS & CANDELS & COSMOS

Among the deepest Herschel, Spitzer and Hubble fields

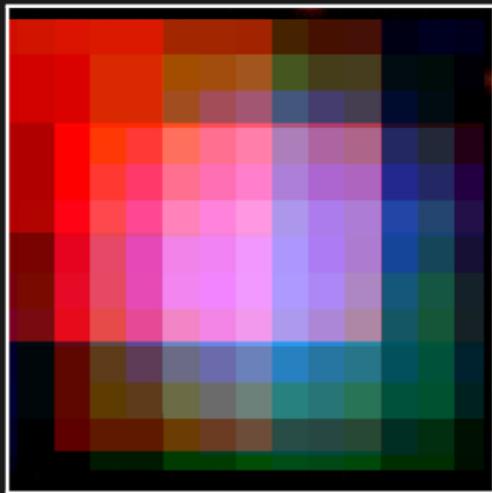
R: 250, G:160, B:100

r-scaled down x1.4

R: 250, G:160, B:100



Herschel



GOODS & CANDELS & COSMOS

Among the deepest Herschel, Spitzer and Hubble fields

R: 250, G:160, B:100

r-scaled down x1.4

R: 250, G:160, B:100

Spitzer → Herschel

a

e

R: 250, G:160, B:100

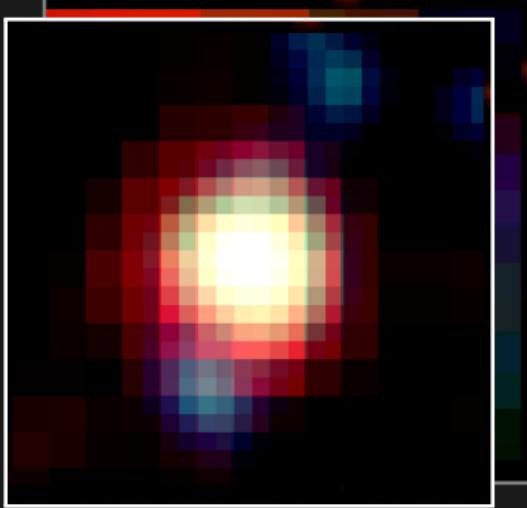
b

R: 160, G:100, B:24

c

R: 250, G:160, B:100

d



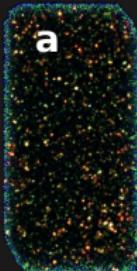
GOODS & CANDELS & COSMOS

Among the deepest Herschel, Spitzer and Hubble fields

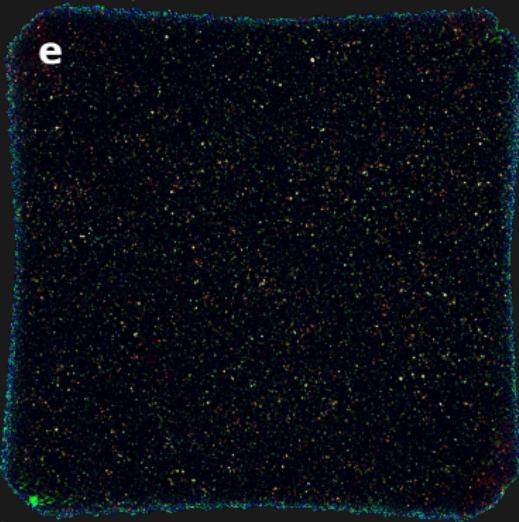
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r-scaled down x1.4

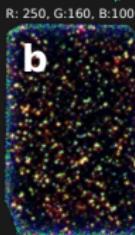
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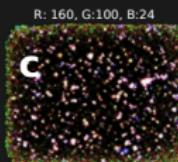
a



e



b



R: 160, G:100, B:24

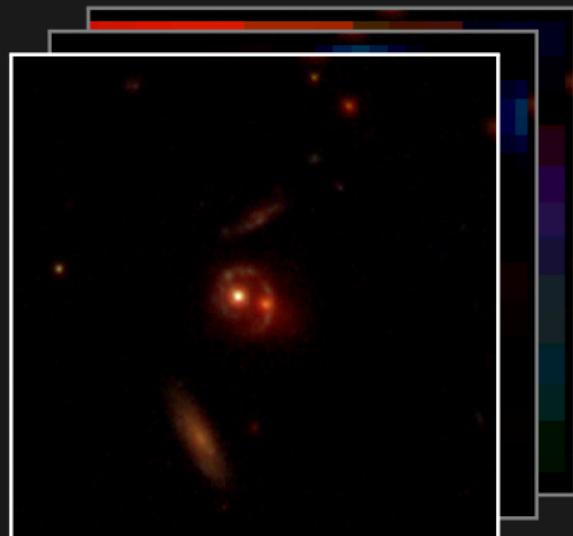


R: 250, G:160, B:100



Corentin Schreiber

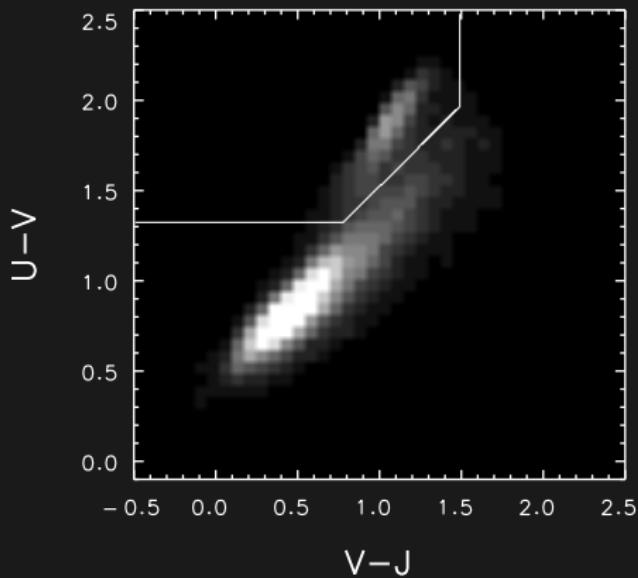
Hubble → Spitzer → Herschel



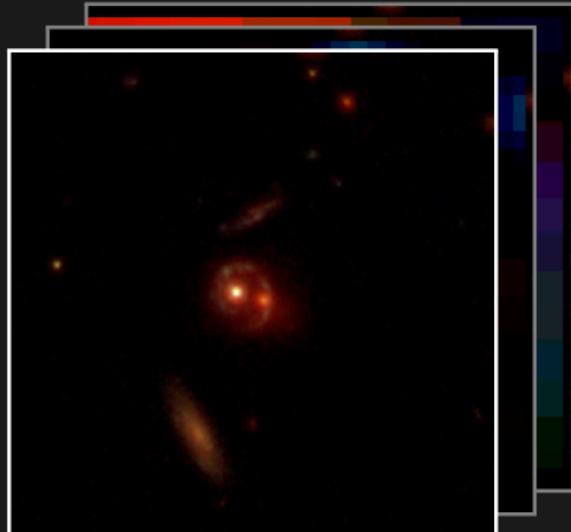
GOODS & CANDELS & COSMOS

Sample selection

selecting star-forming galaxies



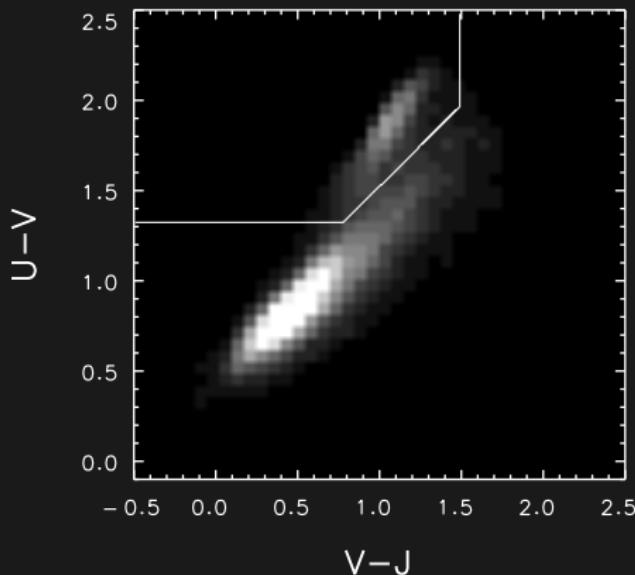
Hubble → Spitzer → Herschel



GOODS & CANDELS & COSMOS

Sample selection

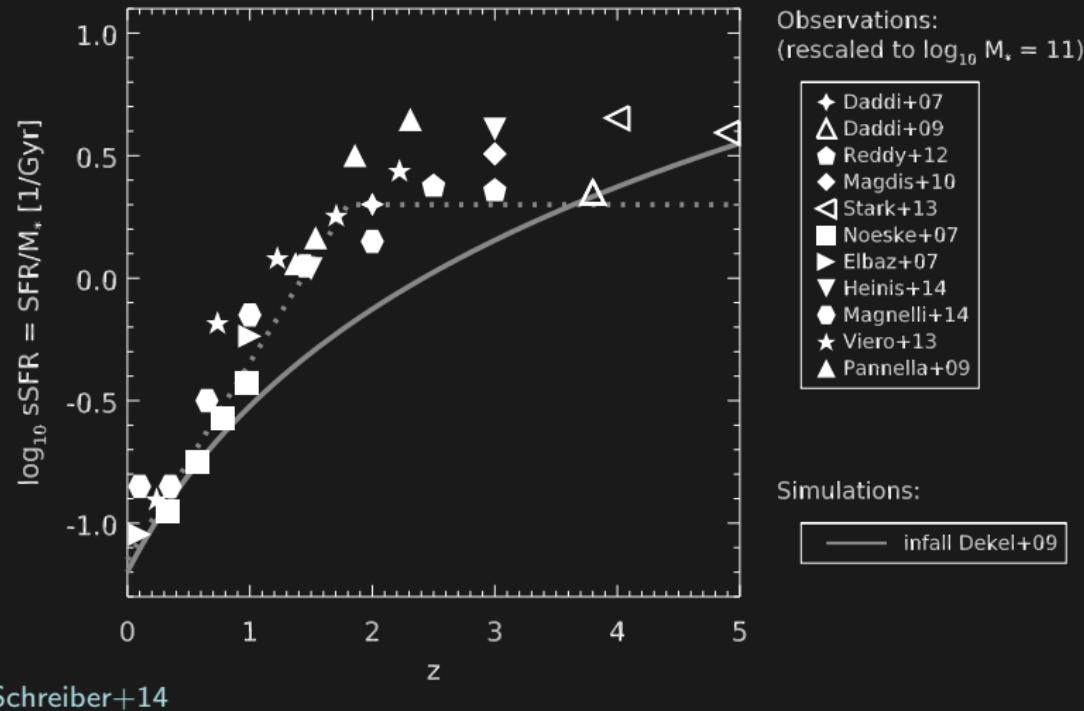
selecting star-forming galaxies



- UV, optical and NIR broad bands
- SED fitting:
 - stellar mass (M_\star) and redshift (z)
- NUV+FIR broad bands:
 - star formation rate (SFR)
- CANDELS: $0 < z < 5$
- 23 000 H-band galaxies ($H < 26$)
- 3 500 *Herschel* detections

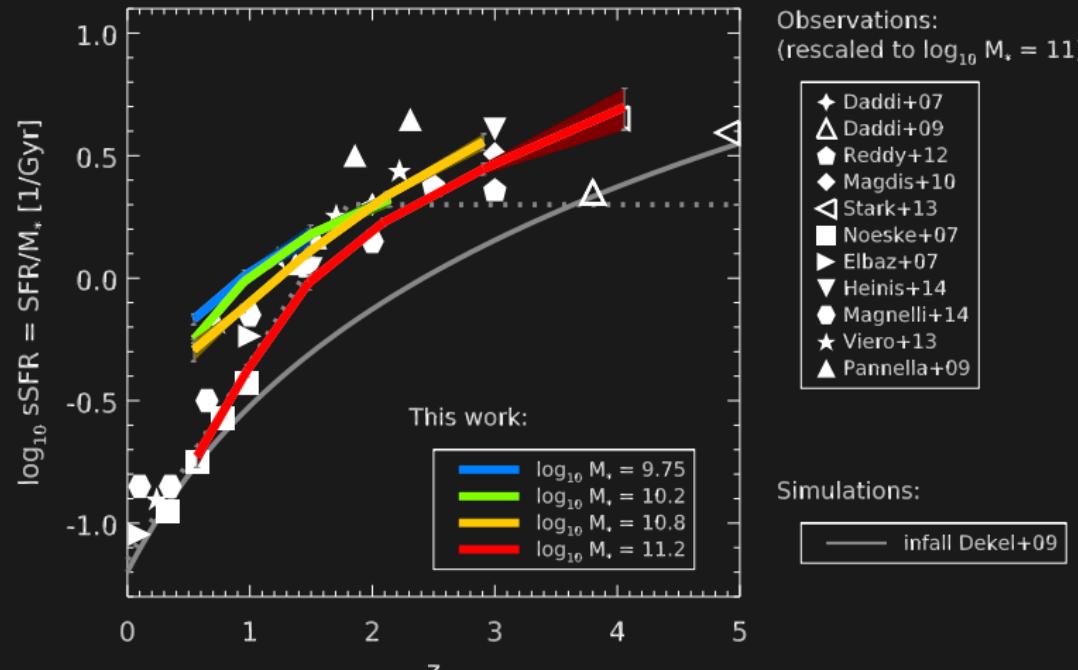
Evolution of the sSFR

A tool to study galaxy evolution



Evolution of the sSFR

A tool to study galaxy evolution

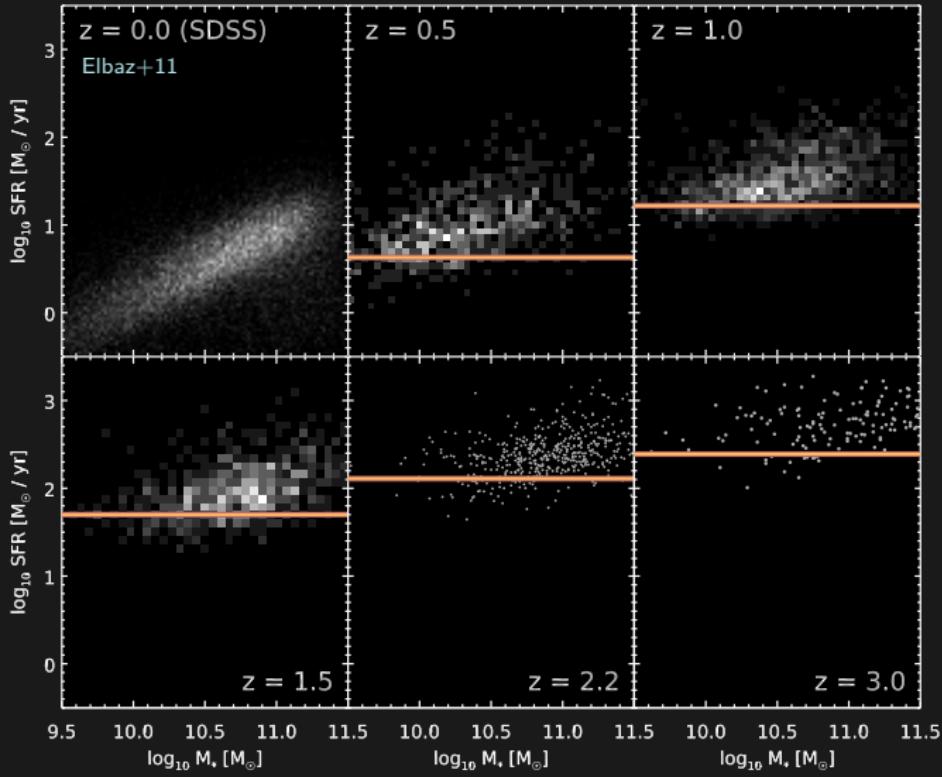


Schreiber+14

The SFR – M_* main sequence

With detections

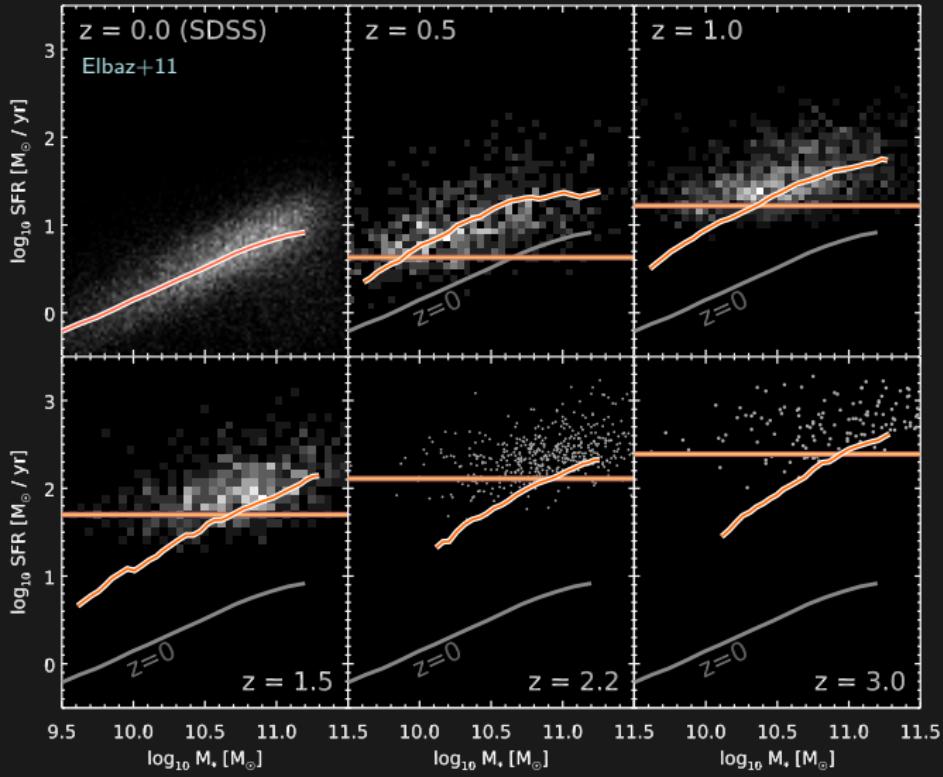
Schreiber+14



The SFR – M_{\star} main sequence

With detections, stacked SFR

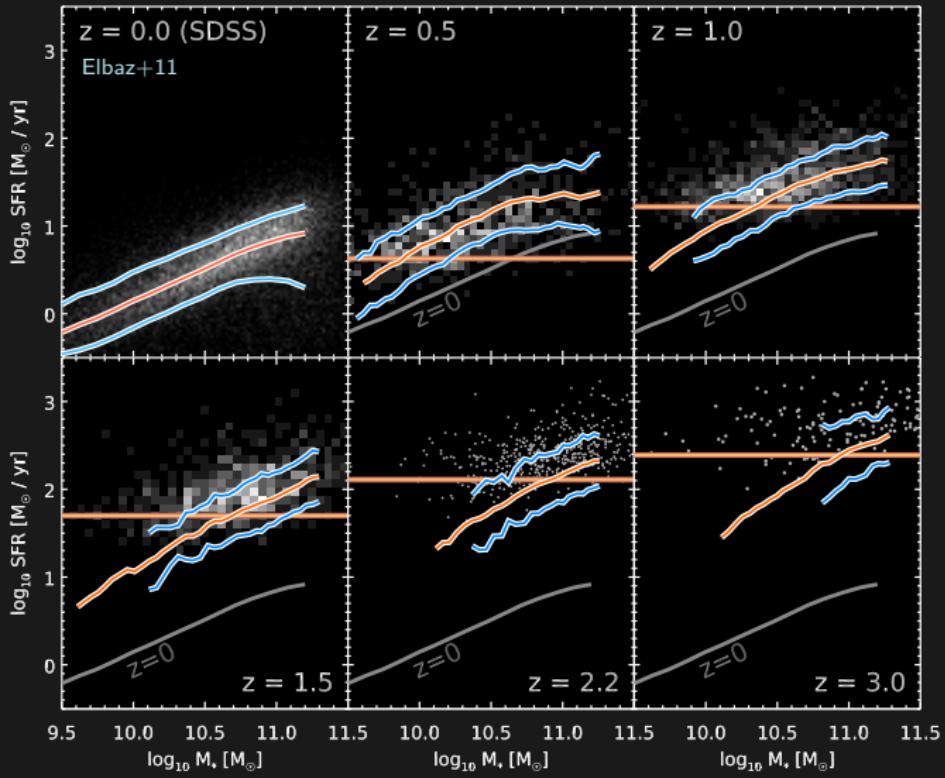
Schreiber+14



The SFR – M_* main sequence

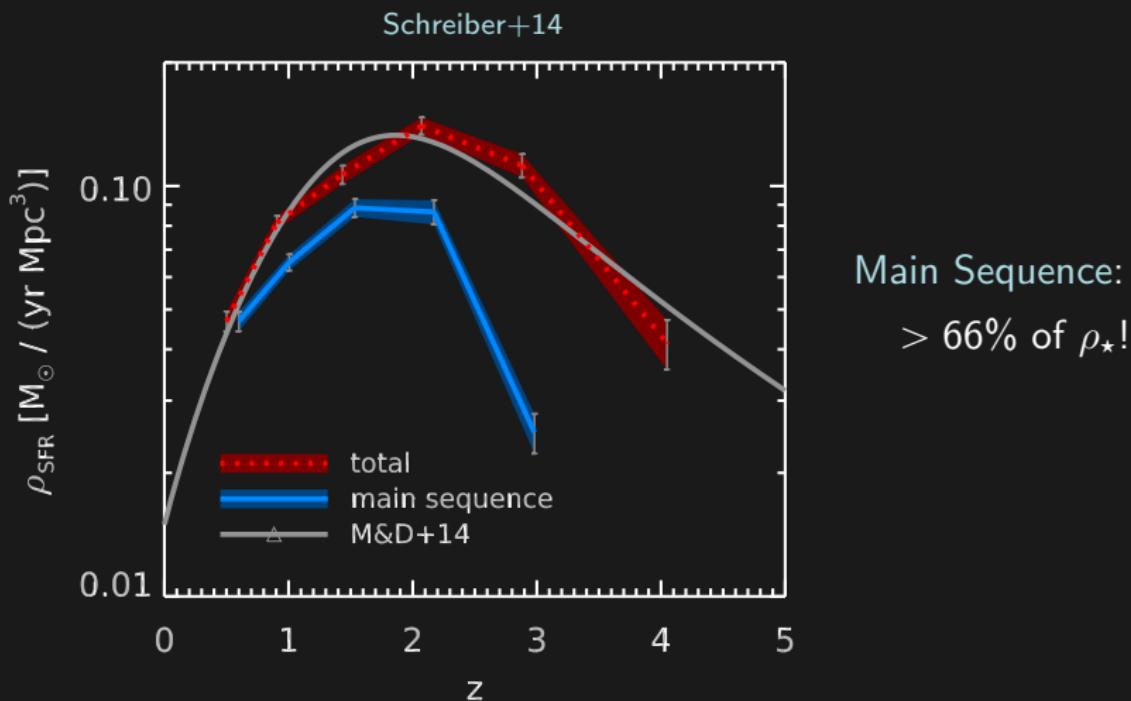
With detections, stacked SFR and stacked dispersion (scatter stacking)

Schreiber+14



The SFR – M_{\star} main sequence

With detections, stacked SFR and stacked dispersion (scatter stacking)

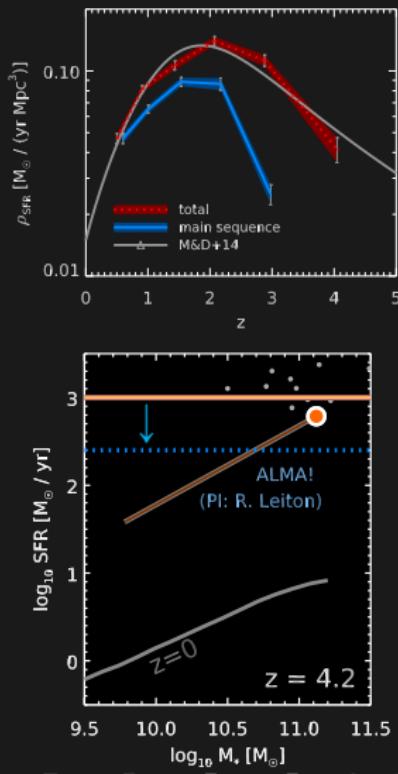
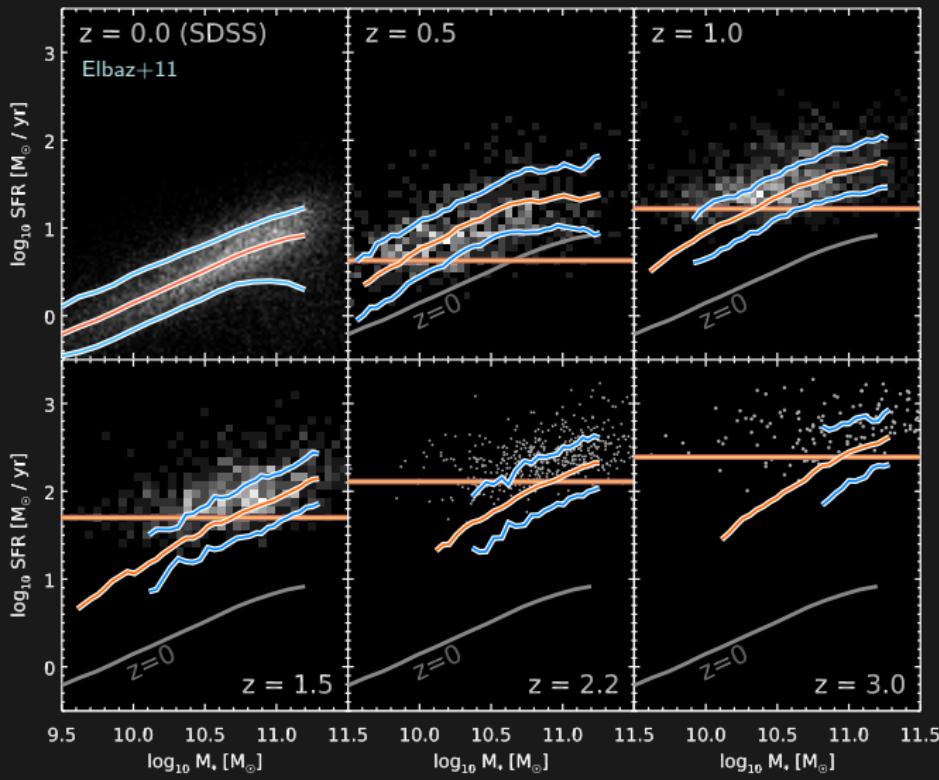


The SFR – M_{\star} main sequence

With detections, stacked SFR and stacked dispersion (scatter stacking)

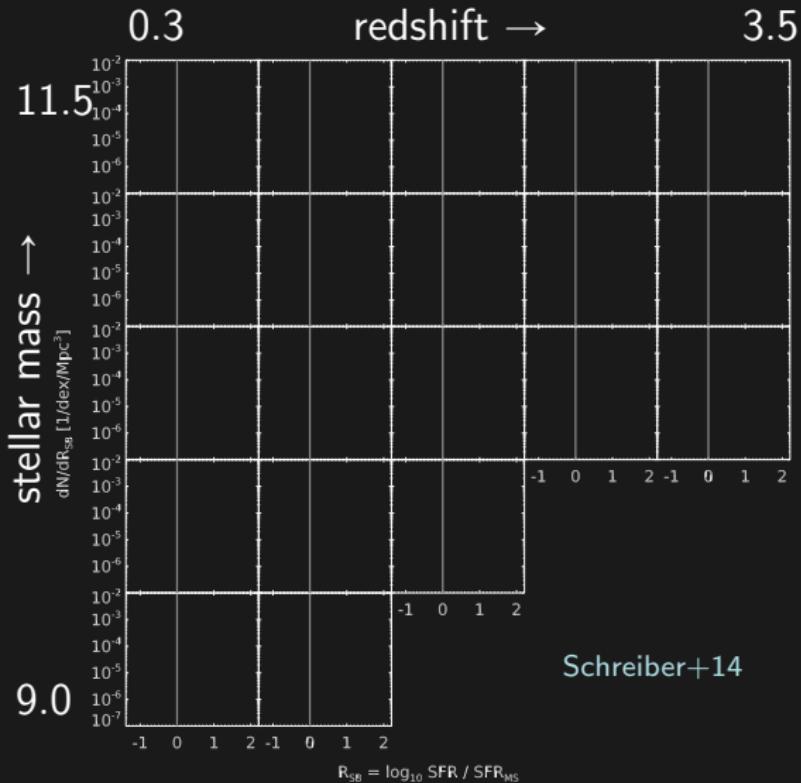
Schreiber+14

Main Sequence: $> 66\%$ of $\rho_{\star}!$



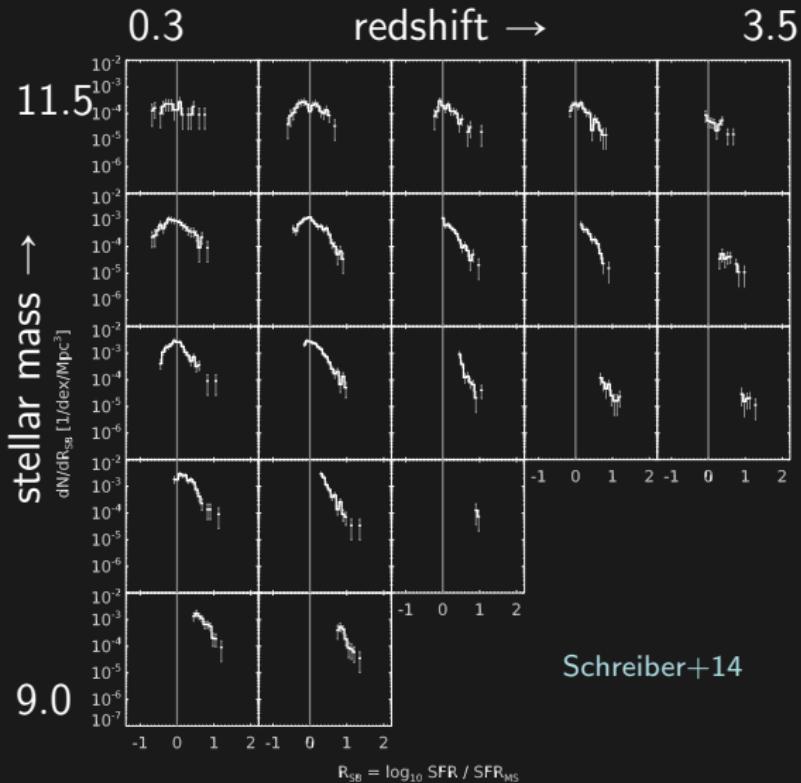
What about detected galaxies?

Distribution of SFR above and below the main sequence



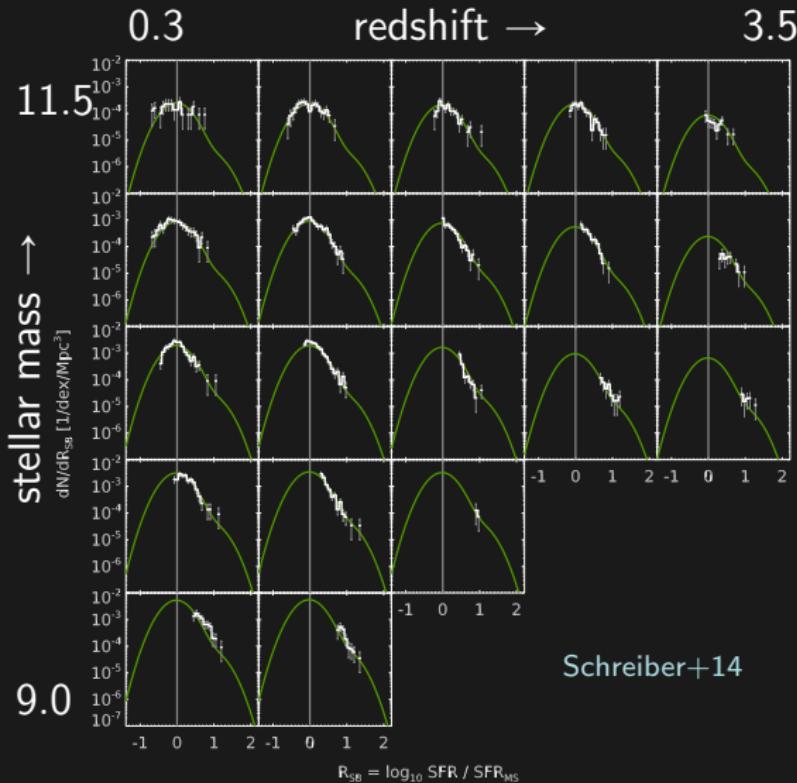
What about detected galaxies?

Distribution of SFR above and below the main sequence



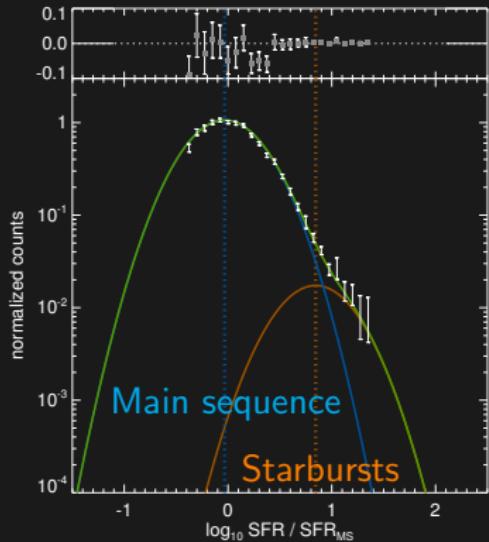
What about detected galaxies?

Distribution of SFR above and below the main sequence



Universal distribution!

at all masses
and all redshifts (see also
Sargent+12)



Take away points

- sSFR keeps rising after $z = 2$
 - agreement with the predicted specific gas accretion rate
- we introduce a new technique to measure flux dispersion of non-detected objects: *scatter stacking*
- main sequence galaxies form *at least* 66% of present-day stars
 - the main sequence is real and dominates star formation
- the distribution of SFR appears to be *universal*
 - questions the role of major mergers and SN feedback